FACTSHEET

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BIOLOGY OF THRIPS IN GREENHOUSE CROPS

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INTRODUCTION

Thrips are a major pest of greenhouse crops in Ontario. For information on controlling this pest see OMAF Factsheet *Management of Thrips in Greenhouse Crops*, Order No. 03-075. A number of thrips species are commonly found including western flower thrips (*Frankliniella occidentalis*), eastern flower thrips (*Frankliniella tritici*), onion thrips (*Thrips tabaci*), and *Echinothrips*. However, western flower thrips is the predominant species and the most difficult to control (*Figure 1*).

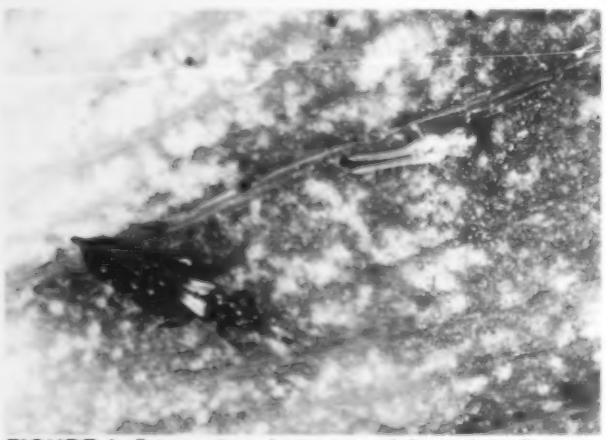

FIGURE 1. Comparison between adult western flower thrips (right) and adult *Echinothrips* (left).

Adult western flower thrips are approximately 1–2 mm in length and generally yellowish-brown in colour. Identification to the species level (especially among western flower thrips, eastern flower thrips and onion thrips) is difficult because of their small size and variability in colouration. Adults are the only stage that can be identified to species. Identification should be done by specialists.

LIFE HISTORY

The life cycle consists of the egg, larval, prepupal, pupal and adult stages. Female adult western flower thrips live up to 30 days and lay 2–10 eggs per day. At 20°C, development from egg to adult takes approximately 19 days, reducing to 13 days at 25°C. The eggs are inserted into soft plant tissues, including flowers, leaves, stems and fruit. In sweet pepper, egg hatch gives the leaves a speckled appearance, with the degree of speckling corresponding to the number of hatched eggs. The larval stage (*Figure 2a*) consists of 2 instars that feed and develop on the leaves, flowers and fruit. The prepupal and pupal stages (*Figure 2b*) often complete their development on the ground or growing medium, but pupation can also take place on the plant. The pupa is a non-feeding stage during which the wings and other adult structures form.

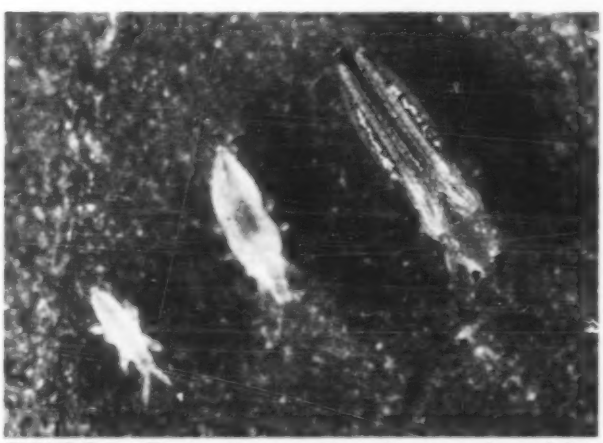

FIGURE 2a. First and second larval instars plus adult of western flower thrips.

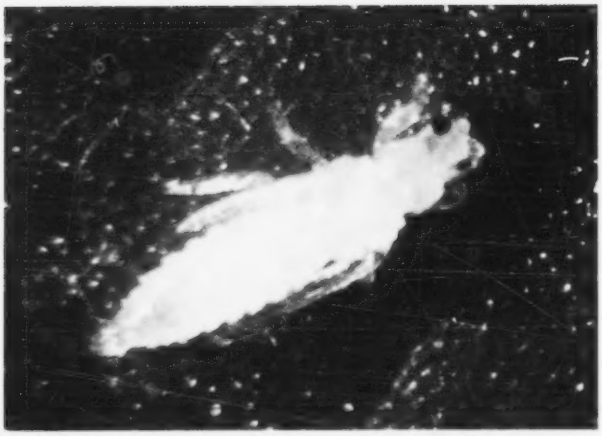

FIGURE 2b. Pupal stage of western flower thrips.

The adults are weak fliers, usually taking short flights from leaf to leaf or plant to plant, but dispersing rapidly nonetheless throughout the greenhouse. Adult thrips can be transported on wind currents and will enter the greenhouse through vents and doorways. All thrips stages may be dispersed by the movement of infested plants, growing media, farm implements and on workers' clothing.

DAMAGE

The adult and larval stages feed by piercing the plant surface with their mouthparts and sucking the contents of plant cells. This causes white or brown spots on the leaves where the plant cells have been destroyed. These spots are also speckled with dark fecal droppings from the thrips feeding.

Vegetable Crops

Thrips damage is noticed first on the lower leaves of cucumber (*Figure 3a*) and tomato, while in sweet pepper (*Figure 3b*) it is evident in the upper youngest leaves. Heavy infestations reduce the photosynthetic ability of the plants and, as a result, the yield.

On vegetable flowers, thrips feeding results in silvery white streaks on the petals. Fruit damage varies according to the crop. For instance, on cucumber, (*Figure 4a*) feeding results in severe distortion and curling and is evident by white striations on the fruit. Feeding on sweet pepper (*Figure 4b*) causes silvery or bronze streaks or spots on the fruit. Thrips also feed on the calyx causing it to turn up and expose the fruit to bacterial infections. On tomato, ghost-spotting has been observed which is a result of thrips laying eggs in the fruit (*Figure 4c*). Ghost-spotting can also occur with sweet pepper and cucumber.

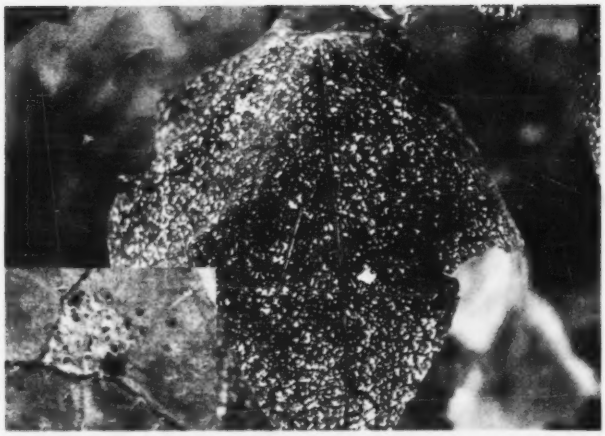

FIGURE 3a. Thrips feeding damage on cucumber leaves; note the dark fecal spots on inset.

FIGURE 3b. Thrips feeding damage on pepper leaves.

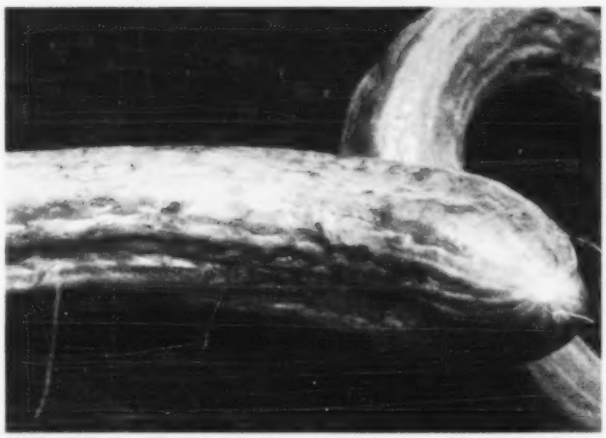

FIGURE 4a. Thrips feeding damage on cucumber fruit.

FIGURE 4b. Egg-laying scars and feeding damage on sweet pepper.

FIGURE 4c. Thrips egg-laying scars on tomato.

Ornamental Crops

Western flower thrips has a host range of hundreds of plant species including many major commercial floriculture crops. Damage symptoms include feeding scars and distortion of leaves. Flowers are particularly attractive to thrips resulting in damage such as streaking and scarring of petals, distortion of flowers and flower buds, and incomplete petal expansion (*Figure 5a, 5b* and 5c)

FIGURE 5a. Thrips feeding damage on roses.
(Photo credit: Colleen Teerling, Agriculture and Agri-Food Canada)

FIGURE 5b. Thrips feeding damage on roses.

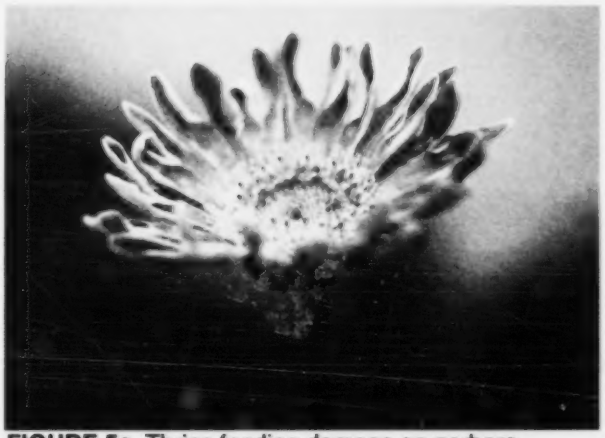

FIGURE 5c. Thrips feeding damage on gerbera.

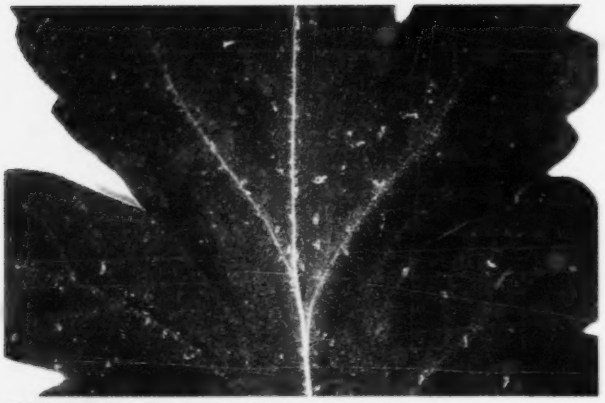

FIGURE 5d. Thrips feeding damage on chrysanthemum leaves.

Virus Transmission

Western flower thrips is the most important vector of a group of viruses called tospoviruses, of which tomato spotted wilt virus (TSWV) and impatiens necrotic spot virus (INSV) are the most common in greenhouse crops. In Ontario generally, TSWV is found in vegetable crops and some ornamental crops such as chrysanthemum, while INSV is more common in ornamental crops.

In vegetables, symptoms of this disease vary according to the host, cultivar and stage of plant development. General symptoms include stunting and near cessation of plant growth, bronzing and curling of the leaves, and distortion of affected plant areas. In addition, infected fruit are misshapen and ripen unevenly, often with a necrotic ring pattern (*Figure 6a* and *6b*).

FIGURE 6a. TSWV symptoms on pepper fruit.

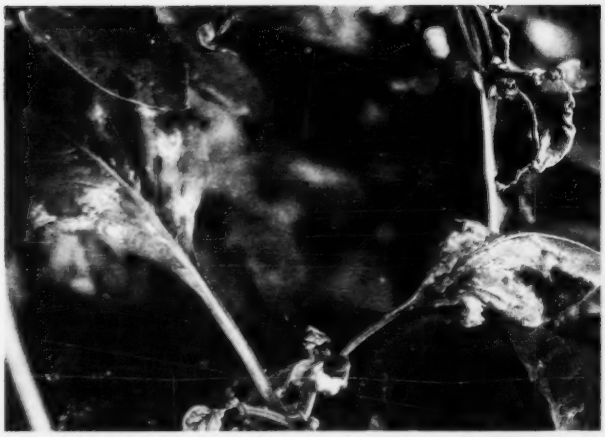

FIGURE 6b. TSWV symptoms on pepper leaves.

In ornamental crops, many different species serve as hosts for INSV. Symptoms and susceptibility vary widely but include: ring spots and line patterns on leaves, necrotic lesions, black streaking on veins and stems, stunting, death of growing points and crown and in some crops (e.g. gloxinia), plant death (*Figure 7a–f*).

FIGURE 7a. INSV symptoms on kalanchoe: concentric ring patterns.

FIGURE 7b. INSV symptoms on Aphelandra: necrotic leaf lesions.

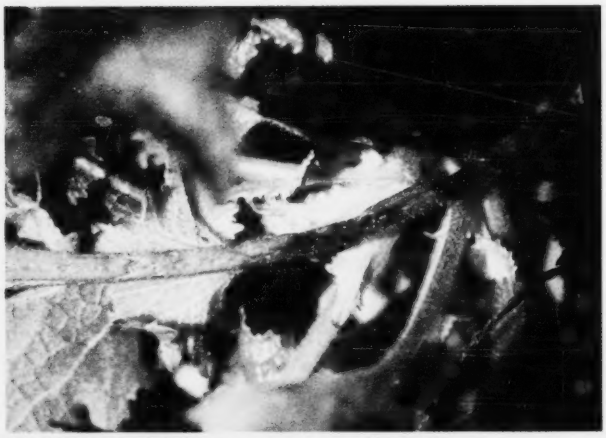

FIGURE 7c. INSV symptoms on cineraria: stem lesions.

FIGURE 7d. INSV symptoms on gloxinia: ring spots and leaf lesions.

FIGURE 7e. INSV symptoms on gloxinia: extreme necrosis leading to death.

FIGURE 7f. INSV symptoms on Exacum: complete plant collapse.

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